BOTANICAL SOCIETY
OF BENGAL

THIRTEENTH ANNUAL GENERAL MEETING

PRESIDENTIAL ADDRESS

BY

Dr, K. BISWAS M.A., D. Sc., F.R.S.E.

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Presidential Address

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Dr. K. Biswas, M.A., D.Sc., F.R.S.E.

BOTANICAL SURVEY OF INDIA

Past—Present and—the Future

Hon'ble Minister, Members of the Society, Ladies and Gentlemen,

I am thankful to you for the honour you have done me by electing me President of the Botanical Society of Bengal. I must say that we have done fairly well during the year in all the spheres of our activities in spite of our very difficult financial position. This has been possible due to the co-operation of all the members of the society. The progress that we have made so far is indeed laudable. I record here my sincere appreciation of the hard work of the Secretary, Sri A. K. Ghosh who devoted much of his valuable time for the work of the society. Sri A. K. Chakraborty's enthusiasm for the welfare of the society is also praiseworthy. The Treasurer managed the purse of the society efficiently and our thanks are due to him. Last but not the least we are grateful to Dr. P. N. Bhaduri for his untiring energy and interest with which he made the publication of the *Bulletin* possible. The annual report will show that we are in great want of funds. We are, however, trying our best to approach the Government of West Bengal and other munificent members of the public who are interested in the cause of science. I am glad to state that our efforts have already borne fruits. The Education Department of the Government of West Bengal, have been pleased to sanction a non-recurring grant of Rs. 600 only to meet our deficit towards the expenses for the publication of our *Bulletin* for the year 1948. We have further asked for a recurring grant of Rs. 5,000 only to cover the expenses of our publications including special publications we propose to undertake and I appeal to you, Sir, to give your sympathetic consideration to our demand. I must say that all our success and the future of the society depend on the whole-hearted co-opeartion of you all. Though it is merely customary that we are sometimes called upon to work as office-bearers of the Society, we must think that every one of us is as important as the President and the Secretary of the Society and should work in full co-operation for nursing this infant society to a healthy adult.

It is the usual practice to deliver a Presidential Address at the Annual Meeting of scientific and literary societies. I presume, therefore, you would expect me to tell you this evening something about my research work or about the Botanical Survey of India or the Royal Botanic Garden, Calcutta which are the main spheres of my scientific and official activities.

It is well-known how the Government of Bengal developed and maintained the Royal Botanic Garden, Calcutta and its Herbarium during a period of 162 years' of its glorious existence. It is also a matter of no mean gratification that after the partition of Bengal the present Government of West Bengal in spite of unforeseen and unprecedented, tremendous stress and strain on all sides and with its extremely depleted budget is upholding the tradition of this scientific institution and carrying on the burden of this *de facto* All India and World Famous National Botanical Institution with their traditional zeal and interest. I have already dealt with the different aspects of researches in Systematic Botany in India and also some aspects of the great contributions the Royal Botanic Garden made towards the welfare of India and the world, in my Presidential Address before the Botany Section of the 30th Indian Science Congress Association. I know also that you and all my fellow botanists in India and abroad are keenly interested in the welfare of the Herbarium and you are all naturally anxious to hear about the future of the Botanical Survey. I, therefore, consider that the Botanical Survey of India would be the appropriate subject for my address to you to-day.

THE BOTANICAL SURVEY OF INDIA

The Botanical Survey of India with its headquarters at the Royal Botanic Garden, Calcutta a department under the Ministry of Agriculture, Government of India was established at the suggestion of Sir George King in the year 1890. This department came into existence primarily for the botanical survey of the provinces of Bengal, Assam, Burma and the Islands in the Indian Ocean with branch centres at Madras, Bombay and Saharanpore under the guidance and supervision of the late Sir George King, K.C.I.E., F.R.S. the then Superintendent, Royal Botanic Garden, Calcutta. The activities include floristic and ecological surveys of the vegetation of the country, collection, classification, naming and preservation of plant specimens in the dry state in the herbarium to serve not only as standards of future reference in taxonomic but also to guide work on co-ordinated branches of Botany, namely, agriculture, horticulture, forestry, economic botany, pharmacognosy.

From 1890 onwards, several parts of India have been partially explored and botanical collections have been stored in the Herbarium at the Sibpur Botanical Gardens. The Herbarium contains at present about 4 to 5 million dried botanical specimens and it is an indivisible part of the Royal Botanic Garden, Calcutta, where more than 15,000 living plants cultivated in the open in regional divisions form what may be called "Herbarium viva". All important food plants, medicinal plants and all economic plants were and are still introduced and cultivated in the botanic garden after thorough study and examination at the Herbarium. The *Records of the Botanical Survey of India* is the official organ for the publication of researches of this department, and the first volume was published in 1893. Volumes I-XIV, Pt. II have so far been published and comprise matter relating to (a) the floristic surveys carried out by the department and (b) the Systematic Botany of India. The Annual Reports which are also printed annually deal with the work done and achievements of the department during the year under report. Valuable information supplied to this country and outside world for the last 60 years,

has contributed much to the progress of botanical science and education and towards the development of Agriculture, Forestry, Horticulture, Economic Botany, and investigation of medicinal, fibre, oil, dye, paper and gum yielding plants. It has also served the cause of many industrial and commercial developments in the country based on vegetable resources.

From 1912, the Industrial Section, Indian Museum, Calcutta and the offices of the erstwhile Reporter on Economic Products to the Government of India were amalgamated with that of the Botanical Survey of India, Royal Botanic Garden, Calcutta. The Reporter became the Economic Botanist to the Survey, who in turn from 1921 became the Curator of the Industrial Section of the Indian Museum subordinate to the Director, Botanical Survey of India (*Ex-officio*) and Superintendent, Royal Botanic Garden, Calcutta. The activities in this section of the survey, relate to (1) the care and improvement of the public gallery of Industrial Section of the Indian Museum, which is mainly an exihibition of economic plants and their products, (2) the collection, record and supply of information regarding all such economic plants and their products which do not specially belong to agriculture and forestry and (3) purely scientific work, mostly concerned with systematic botany and the supplying of information in connection therewith.

The Industrial Gallery contains about 36,000 exhibits, which are alphabetically arranged, and more or less illustrate the articles on the economic plants of India, published by Sir George Watt, in his "Dictionary of Economic products of India" in 1897 in six volumes and the "Commercial Products of India" published by the same author in 1908. Prior to its responsible for the publication of what are called "Handbooks of Commercial Products" in the Imperial Institute Series from 1892-93 which were subsequently substituted by Agricultural Ledgers. The latter continued from 1894-1912 and 275 ledger articles, dealing on the economic products of India were issued. From 1912, these in turn disappeared or discontinued after its revival for a short time in 1927 by Dr. J. M. Cowan the then Superintendent, Royal Botanic Garden, Calcutta, and *ex-officio* Director, Botanical Survey of India, at present, Assistant Regius Keeper, Royal Botanic Garden, Edinburgh. Now the work of this section is confined to the care and upkeep of the Industrial Gallery and supply of economic information on the industrial and commercial vegetable products of India. The exhibits in the gallery, the economic herbarium and the library of economic literature form the material for the study of the economic botany of India. The organ of publication is apparently the same "Records of the Botanical Survey of India," besides catalogue of exhibits which appear from time to time. Notes on "Cinchona", "Ipecauanha, "Kurchi" bark, "Papain, and Pyrethrum" insecticide have been pubilshed from this section.

The Section on Systematic Botany, stationed in the herbarium of the Royal Botainc Garden and that of Economic Botany in the Industrial Section of the Indian Museum work on a co-ordinated plan, the work of one being supplementary to that of the other and vice versa. The Director of the Botanical Survey of India as *ex-officio* Superintendent, Royal Botanic Garden, Calcutta and Superintendent, Cinchona Cultivation, Bengal was in charge of these sections till 1937.

The scientific staff of the Botanical Survey of India now consists of the Superintendent, Royal Botanic Garden, Calcutta carrying on the work of the Director, Botanical Survey of India so far as it relates to the Herbarium and one solitary Assistant for Systematic Work on this side of the river and a Curator of the Industrial Section on the Calcutta side. The re-organisation of this survey has been on the anvil from 1917 onwards without any result so far.

It can, therefore, easily be realised how extremely urgent it is for us to study the plants growing in the vast unexplored and insufficiently explored areas of the country and find out definite ecological data with a view to cultivating on a large scale more food plants, medicinal plants and other economic plants in suitable areas, each under favourable climatic and edaphic conditions. Without a thorough investigation on proper scientific lines much of the experimental work involving considerable sums of money is likely to be wasted. There are large number of unknown and little known food plants, fodder grasses and grasses allied to wheat, barley, sorghums etc., paper yielding plants, fibre, gums and dye yielding plants and last but not the least, many aquatic and other edible herbs and enormous stock of lower plants which can be grown in different areas on a large scale in order to supplement the present food supply and develop industries based on rare plant materials.

Hence from the applied side as well, the development of the Botanical Survey of India is a vital need to the country. Then again proper systematic and taxonomic work has both on the purely scientific and on the economic sides an educative function which, by its nature, is beyond the scope of any department or any university other than the Royal Botanic Garden and the Botanical Survey of India. This function entails the upkeep and continuous development of a public herbarium and a museum to illustrate in readily intelligible form the outlines of botanical science in general, and the vegetation of India and its chief economic vegetable products in particular. It will thus be obvious why the magnitude of the scientific work which comes within the purview of the Botanical Survey of India prompted the experts some time ago to suggest 10 Botanists, 5 Chief Botanists and 12 Agricultural Botanists in addition to the Director and Deputy Director of the Botanical Survey of India and Curator of the Herbarium for discharging efficiently all the functions of the Botanical Survey of India.

The time has long gone by when a progressive country can afford to be satisfied with a knowledge only of the higher plants of its vegetation. The primitive forms of plant life are not only important to the plant geographer and the general botanist, but they have a practical significance, as in Penicillin, which makes it impossible to ignore them. All the arguments, scientific as well as economic, in favour of having a survey of the higher forms of plant life (such as the Indian Botanical Departments have hitherto mainly concerned themselves with) apply equally to the lower.

It has rightly been stressed by such well-known scientists as Lt.-Col. A. T. Gage, I.M.S., the then Director, Botanical Survey of India, G. A. D. Stuart, I.C.S. Officiating Agricultural Adviser to the Government of India, P. H. Clutterbuck, Esq., C.I.E., V.D., F.Z.S., F.R.G.S., F.E.S., Officiating Inspector-General of Forests, E.J. (later Sir Elwin) Butler, Esq.,

M. B., C.M., F.L.S., Joint Director, Imperial Mycological Bureau, London, and Lt-Col. H. Ross, O.B.E., I.M.S., Assistant Director-General, Indian Medical Service, that 'recent events have proved beyond all doubt that expenditure on scientific research is one of the most profitable investments a Government could take up. It has been made abundantly evident that the country that neglects the scientific investigation of its natural resources pays very heavily in the long run for its neglect'. This is a hundred times true in these days of scientific progress. The future agricultural and industrial developments of India demand that the inexhaustible vegetable wealth of her forests, fresh-water areas and vast coast line should be properly worked out for the welfare of the people of our country.

The revival of the Botanical Survey of India has thus been repeatedly urged by the past and the present botanists in India and the world renowned scientists from overseas with very little effect on the authorities so far. It is also to be very much regretted that the vast plant collections which are valuable botanical treasures of the East are niether properly utilised for solving the food problem, nor for the progress of botanical science in India and the floristic researches in Asia in particular and the world in general and thereby raising the scientific status of Free India among the Comity of Nations.

The different sections of the present Botanical Survey of India and the proposed future developments of the Survey are shown in the Table attached herewith.

After prolonged discussions by departmental experts, proposals for expansion of the Botanical Survey of India to be conceived as post-war development of fundamental research bearing on sciences applicable to the theory and practice of agriculture in its broad sense, which were unanimously accepted by the then Government of India in 1944, are as follows :

(i) The Survey should provide for special exploratory expeditions in areas like Tibet, Central Turkistan, countries of the Far East with a view to enriching the National Herbarium and Botanical Museum with specimens of flora of these unexplored areas and knowledge about it.

(ii a.) With a view to securing liaison with the Universities on the one hand and for extending the cadre of trained botanists on the other the Director should employ on the Survey staff selected research students in Botany on tenures varying from 1 to 3 years with suitable stipends. Selected research students will be trained in this work by the Director and his staff before joining the survey parties.

(b) Students with special aptitude in botanical research should be selected in sufficient numbers for a course of special training at Kew, with a view to their being ultimately absorbed in the permanent staff of the Botanical Survey of India.

(iii a.) The Royal Botanic Garden with its Herbarium and Library should be taken over by the Government of India.

(b) The post of the Director, Botanical Survey of India should be revived ; and the post should be amalgamated with that of the Superintendent, **Royal Botanic Garden, Sibpur.**

(c) The Industrial Section of the Museum dealing with economic plants should be kept separate as at present under the Curator, but should be under the general control and supervision of the Director of the Botanical Survey of India. The function of the section will be confined to what is covered by normal functions of the Museum. The work relating to technological or industrial research for the development of the utilization of plants or plant products for economic ends or work relating to the introduction of new plants will not be the function of the museum.

(d) The Herbarium of the Economic Plants and the Library relating to these plants should continue to be housed at the Museum as at present.

(iv) The Herbarium of the Royal Botanic Garden at Sibpur should be enlarged to make room for the new plants to be collected.

(v) The Research Laboratory for the investigation of the lower plants and for general Systematic, Taxonomic and Exploration work should also be properly extended.

(vi) A Training Centre should be opened at the Royal Botanic Garden, Sibpur for giving a course of practical training in horticulture other than the culture of fruits and vegetables.

Since then a Training Scheme introduced from July 1946 has been given effect to with a view to absorbing the trained systematic botanists in the reorganised Botanical Survey of India but it appears that there exists very little prospect of absorption of these trained workers in the Botanical Survey of India in near future. In fact, the training, knowledge and experience in the Herbarium work, systematic and field botany gained by the first batch of the trainees who had completed their course appear to have gone to waste and their career upset. The post of the Director, Botanical Survey of India was also revived and the present incumbent to the post of the Superintendent, Royal Botanic Garden, Calcutta was duly selected through the Federal Public Service Commission and was appointed Director of the Botanical Survey of India and *ex-officio* Superintendent of the Royal Botanc Garden, Calcutta. Implementation of this order has, however, been held in abeyance for the present on account of financial stringency.

I shall now make an attempt to give you some idea of the enormous range and possibilities of botanical explorations and the wide scope of the work of the Botanical Survey of India. The botanically unexplored and partially explored areas of India are scattered all over this vast sub-continent from the Himalayas to the Cape Comorin and from Afghanistan to the borders of China.

The unexplored regions *i.e.*, those regions from which botanical collections are not represented at all or only partly represented in the Sibpur Herbarium are Baluchistan, parts of North-West Frontier Provinces beginning from Quetta Northwards, Waziristan, North and North East Kashmir,

Sind, Rajputana, the whole of the Himalayan Range of Hills to the east of Garhwal as far as Mishmis, the Terai and the dooars along the foot of District, the Terai and the dooars of Nepal and Bhutan along the foot of Himalayas. This area includes the whole of the kingdoms of Nepal, Sikkim and Bhutan towards the East, parts of Assam to the East of Brahmaputra including the States of Manipur, Tipperah, Garo Hills, Lushai Hills and as far South as the Chittagong Hill Tracts have been only partially explored. Within the Province of Bengal not only the upland country but also the plains of Bengal are again poorly explored. The Feudatory States of Orissa, the whole of the Hilly Zamindary regions of North East, Central Provinces as far as the plateau of Chotanagpur, the Bastar State in the South-East corner of the Province are quite unexplored. The whole of the Central India, Kathewar and Cutch are all *terra incognita*. The agency tract of the Madras Province from Ganjam to the Godavary Districts, the whole of Hyderabad, Mysore, Central Travancore, the Bababodans of Mysore and the high wavy mountains of Madras and the higher ranges of Coorg are again botanically little known.

Thus the total areas of unexplored and insufficiently botanised regions of India, including forests of Native States will approximately be about 125,000 sq. miles out of a total forest area of near 250,000 sq. miles. Nothing short of an intensive exploration will meet the demands of both an accurate botanical knowledge of India even in her present partioned form, and our future economic exploitation is based on such a complete knowledge. For purposes of efficiently handling such a vast extent of vegetable wealth of India spreading over different configurations and diverse climatic conditions, the entire area should be split up into five administrative divisions. For efficient work each of those divisions, circles or unit area will be placed under a Chief Administrative Officer who will direct and control the survey in that Division assisted by a number of Botanists., Assistant Botanists, Research Scholars, Fieldmen etc. The whole of India can thus be conveniently divided into five natural field circles, namely : (1) *North-West Circle,* excluding Sind, Beluchistan, North West Frontier Province and adjacent countries outside India, but including Kashmir, North West Tibet, North West Himalaya as far as the Lake Manasorowar, Tehri-Garhwal, East Punjab, Hindusthan Prodesh, East Punjab States Union, Parts of Upper Gangetic Plain and Bihar ; (2) *Eastern Circle,* including Eastern Nepal, Sikkim, Bhutan, Central and Eastern Tibet, W. Bengal and Assam ; (3) *Central Circle,* the whole of the Central Provinces and Berar, Central India including Madhya Bharat, Vindhya Pradesh and Orissa ; (4) *The Southern Circle,* including the whole of the Eastern half of Peninsular India (Madras Presidency) ; and (5) *Western Circle,* the whole of the Bombay Presidency, Saurastra, Cutch, Malaya, Rajputana and Rajasthanas.

Each of the above divisions or circles will be under the immediate administrative charge of a Chief Botanist (analogous to the Superintending Geologist of the Geological Survey) who will direct and supervise the operations in the circle and he will be responsible to the Director of the Botanical Survey of India for the proper conduct of work and reports connected with his circle. Each such Chief Botanist will approximately have about 30,000 sq. miles unit area of the country to explore and report upon. At the rate of 300 sq. miles per botanist per year, no less than 5 to 6

botanists would be required to complete the survey within 15 years. At this rate about 20 Botanists would be required to complete the survey work of the entire area within the specified period of 15 years.

It can thus be easily realised what an enormous collections will accumulate as the normal work of the Botanical Survey of India gradually proceeds on right line and will attain its final form, if the reorganisation of the Botanical Survey of India is given effect to. These materials will threfore offer immense opportunity for floristic work in all its aspects of all branches of the plant kingdom as delineated in the table referred to above.

It is really a gigantic task but I am confident that the so-called lack of trained personnels will soon be overcome and with the help of our young promising workers such a task will be done satisfactorily, as I presume proper training in Systematic Botany and Field work will also be given in the Universities. All the results of our investigations will be embodied in the numerous publications which will finally form the basis for the preparation of a new *Flora Indica* of Free India. Such a Flora will be much more enlarged, more complete than that of the old and out of date Hooker's *Flora of British India*, and it will be fully representative of all the branches of the plant kingdom. The fully developed Botanical Survey of India will thus advance the knowledge of the plant world of our country.

The strength of the scientific stuff of the reorganised Botanical Survey of India will be as follows : 1 Director, 1 Assistant Director, 1 Curator of the Herbarium, 5 Chief Botanists, 20 Assistant Botanists, 12 Research Assistants, 37 Field men, 2 Photo-Artists, 4 Artists and one Librarian to be assisted by 11 subordinate staff and 28 menials (see Table).

Recurring expenditure, under the proposed reorganised Botanical Survey of India is estimated to be about 2-3 lakhs in the first stage of development and about 4-5 lakhs in the fifth year, when the full strength of the staff will be in force. Other non-recurring expenses will involve addition of two wings to the present Herbarium at the Royal Botanic Garden, Calcutta, officers quarters for the Botanical Survey of India, equipments for the Herbarium, the Library and the Laboratory to be estimated by the Central Public Works Department. But this estimate should not and must not be used as a plea for financial stringency in the development of the Botanical Survey of India which can immediately be given effect to in its initial stages with a very moderate financial commitment on the part of the Government of India, as the Government of West Bengal is agreeable to continue to bear the burden of the more expensive institution, namely the Royal Botanic Garden proper. It need be stressed that the development of the Botanical Survey of India is a prerequisite to all developmental schemes in Agriculture, Forestry, Fishery etc. The skeleton Botanical Survey of India is already there, and even if it is only to develop on a very modest scale with very little expense, it will go a long way towards solving many urgent problems facing the country so far as they relate to the vegetable kingdom. There can therefore be no excuse whatsoever to lay the axe at the root of one of the most important nation building scientific departments of the Government of India. The incongruity of financial reason to postpone reorganisation of the Botanical Survey of India will be revealed by compar-

ing side by side the development of the Botanical Survey of India and the Geological Survey of India as given effect to during 1948-49.

The policy of the development of the Geological Survey of India was adopted by the Government of India along with the proposed reorganisation of the Botanical Survey of India. In fact, my skeleton scheme of the Botanical Survey of India, as mentioned above, was accepted in 1944 with little progress whatsoever and now its future is as dark as ever. But on the other hand, the sister department namely the Geological Survey of India had gone far ahead towards fulfilment of its final object as it has been revealed in Dr. W. D. West's Presidential Address on "Geology in the Service of India" delivered at the Mining, Geological and Metallurgical Institute of India on the 28th January, 1949. Dr. West said :

"When, however, in 1945, the Government of India announced their intention to expand the Survey permanently, the outlook for geologists changed ; and the position is now such that lack of geology graduates no longer stands in the way of the Department's expansion, though experienced geologists are scarce. Further, the Government of India's plan to send students abroad for specialised training is begining to bear fruit, and the first batch of geologists and geophysicists are now returning to India."

"The result of all this is that to-day the number of geologists and other scientific officers in the Survey has risen to 150, as compared with 27 before the war ; while there are plans for expansion to a total of about 250 gazetted officers in the next few years. But plans, however, well devised are of little use unless they are implemented. And here I may perhaps be pardoned if I refer to the part played by our Minister, the Hon'ble Shri N. V. Gadgil. Our first five year plan, which visualised an expansion to about 140 officers, seemed ambitious enough to most of us when compared with the meagre staff previously considered sufficient. But to one who had a clearer view of the importance of mineral development, and of the part that geology must play in that development, it was only a begining, and in consequence our target is now likely to be raised to 250 officers. With the extra staff thus being made available it is possible to organise the Department in a proper way, and the plan of organisation and the methods being developed may be briefly referred to."

It is a great pity that although Rs. 20.93 crores have been allotted during 1948-49 for the nation building schemes such as, Education, Medical, Public Health, Broadcasting, Aviation and *Conduct of Scientific Surveys and Research Institutes,* nothing has been provided for the revival of the nation building department of the Botanical Survey of India. It is, therefore, really inexplicable why is this department of the Government of India receiving a step motherly treatment even under the Government of free India.

It is admitted on all hands that the prosperity of a country lies on the development of its agricultural, industrial and commercial wealth. The study of the ecology of edible and economic plants both indigenous and foreign in their natural habitats for introduction and acclimatisation in this country, supply of valuable information on various problems in the

investigation of our forests, the researches on fresh-water and marine aquatic flora for nutritive food, pisciculture, purification of drinking water, malariology and navigation of water areas, study of medicinal plants floristic analysis of the grassland vegetation forming the soil cover so important in the provision and investigation of nutritive fresh food for our poor starved cattle and the world problem of soil erosion, soil survey and plant protection have not evidently been fully realised.

In a recent discussion of an international character on the "Organisation of Taxonomic Research" at the Linnean Society of London, the Botanical Survey of India also figured prominently. Dr. N. L. Bor, the Assistant Director, Royal Botanic Garden, Kew remarked "It is quite obvious that organisation and expansion of any type of research costs money. In democratic country the provision of funds is subject to the votes of individuals and to the scrutiny of officials who are themselves only too rarely men of science. **It is not that those of us who controlled scientific institutions in India did not know what should be done—we did not know that—the difficulty was to persuade those who control the purse-strings to disgorge the funds necessary not only for maintenance of current research but for desirable expansion.**" The attention of the world botanists has thus again been drawn to all those concerned for obvious reason of India's stock of enormous potential vegetable wealth which should and must play a great part in the international development of agriculture, industry, trade and commerce for the general well being of humanity at large.

You all know that from 1910 up to the present date to what extent Government of India had been and still being urged by both officials and non-officials botanists, botanical societies, other scientific bodies and editors of important scientific periodicals and world renowned scientists in India and abroad including Sir Arthur V. Hill, F.R.S., Secretary, Royal Society of London, who came to India in 1944 to advise the Government in scientific matters, but it appears all our resolutions*, recommendations* and views* have so far fallen into deaf ears. It will thus be clear from the above that I have left no stone unturned to convince the Government but as it appears now with very little effect. Present stagnation of the Botanical Survey of India, I should say, is suicidal to the country in this progressive world of science. The country has retrogated 100 years at least in respect of floristic researches in particular and progress of botanical science and education in general.

I must confess that I have utterly failed to follow the policy of the Government of India particularly towards the Botanical Survey of India. It is well-known to you that this survey is one of the very oldest Departments of the Government of India. Its reorganisation scheme was thrashed out and drawn up as long ago as 1919 by the eminent and expert officers who were then Members of the Board of Scientific Advice under the aus-

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* Appendix I. Resolution of Indian Science Congress 1939.

* Appendix II. Some of the recommendations and suggestions on scientific researches in India by Sir A. V. Hill, F.R.S.

* Appendix III. Views of Sir William W Smith and extracts of Editorial comments of Science Culture (1945-46).

pices of the then Government of India. The re-organisation scheme was accepted by the Government of India but the implementation of which was indefinitely postponed on account of the alleged financial reasons prevailing at that time. The time I speak of was when so many new Departments what are now characterised as Nation Building Departments now actively functioning were altogether unknown. It will thus be quite clear to you that when the financial condition of the Government of India improved the Botanical Survey of India should have received the first recognition and support on the basis of priority claim at least, but intentionally or unintentionally the Botanical Survey of India instead of receiving such recognition, active and material support was left truncated since the end of 1937. Such a policy would appear not only to me but to you also as a piece of conundrum. It is really a sad contrast. It therefore naturally raises some doubt in my mind as to whether the existence of the Botanical Survey of India is at all considered necessary or not by the Government of India. I therefore wish that the Scientific Public of India should appreciate the actual position of the Botanical Survey of India and ponder over the matter carefully as to whether such a deplorable condition should be allowed to continue any longer.

I am also deeply concerned about the fate of the irreplaceable collections of our world famous "Sibpur Herbarium." The Indian Botanists and the botanical world outside consider this repository of precious plant materials as the National Herbarium of India and also its invaluable collection of literature as the National Botanical Library. Present India will owe an explanation to the future generation and the scientific world at large for the deteriorations and gradual decay of its several millions valuable sheets of botanical specimens, Icones and rare botanical literature now accommodated to its highest capacity in the present harbarium building. Hundreds of botanical specimens collected from some of the inaccessible areas of India and adjacent countries such as Burma, Malaya and China are lying scattered all over the building on open shelves, floors and tops of almirahs and in godowns exposed to the action of nature. The loss of all these irreplaceable collections due mainly to want of space for proper accommodations, will mean the end not only of botanical education and science in this country but also seriously hamper the progress and proper scientific investigations in botany, agriculture, forestry, horticulture and all other cognate sciences and last but not the least India will lag behind for centuries in raising her scientific status before the botanical world. It will thus be obvious that the present Herbarium building demands immediate expansion. Plans for additional wings have already been prepared. Laboratories, Lecture Halls, Hostels and Officers' quarters all are provided in the proposed plan for the re-organised Botanical Survey of India, but heaven knows when all these will come to fruition.

In this connection I should, however, disperse once for all certain misapprehension entertained in certain quarters who have gone even so far as to suggest removal of the Herbarium outside Bengal on account of the so-called adverse climatic conditions prevailing over its present site. There is absolutely no ground and justification for any misconception whatsoever as regards the effect of moisture on these collections. This question engaged the attention of the then Government of India and the experts appointed

by the Government examined the specimens carefully some years ago and they actually found that the cotype and authentic sheets in the older collections are better preserved. It is well-known to all, that certain amount of humidity and moisture are essential to keep the sheets flat and this applies with special reference to the 160 years' old fragile specimens, which should be kept soft enough to lie properly stretched upon the sheets at all seasons. The atmospheric condition by the river-side like that of the famous Kew Herbarium, which is also situated on the bank of the Thames is therefore really favourable to the preservation of the specimens. You are perhaps aware of how even the old records in the National Archives crumbled to pieces due to extremely dry heat during the hot weather in New Delhi. This is also true with regard to the other towns in the Punjab and United Provinces. There is however no contradiction in my above statement and what I said before regarding loss of the specimens. I therefore make it perfectly clear to you that the deterioration, decay and final loss of the specimens mentioned by me, is apprehended simply because of the utter lack of space in the present Herbarium building. There is actually not an inch of space for further incorporation of specimens. Further accession means mechanical crushing of the old sheets. Moreover, there are hundreds of valuable materials lying outside the existing almirahs for want of accomodation in suitable cabinets.

There has also been some criticism about the lack of publications during the last three or four decades when the scientific staff consisted of practically three and sometimes even two (one of them going on leave) officers *viz.*, the Superintendent and the Curator of the Herbarium under the Government of Bengal and one Systematic Assistant in the Botanical Survey of India. Thousands of plants are to be identified, hundreds of queries are answered, various types of work in the library is attended to and preparation of numerous reports based on scientific investigations are furnished during the year in addition to the normal routine work and administration of the two departments as will be seen from the annual reports. In spite of these and other multifarious duties there has been no dearth of valuable publications from 1927 to 1949. In the preparation and completion of the "Flora of Assam and Madras, Prain and Burkill's work on *Dioscoreas*, Cowan's Trees of Northern Bengal, Duthie's Flora of Upper Gangetic Plain, Vol. III, Pt. III, and many floristic works of others much help has been rendered by Mr. V. Narayanswami and myself during the tenure of our services. A list of the publications by the staff of the Herbarium is appended. It is no mean credit for the Indian officers since their appointment to do so much in addition to their day-to-day heavy routine duties.

I have made an attempt to make a clean breast of how matters stand over which I have no hand, so that I may not be blamed or held responsible for all that had happened in the past and might be happening in future, if nothing is done for betterment of this department and the Herbarium. Nevertheless, in spite of all the difficulties around us for the progress and development of botanical science and education in this country on the plea of so-called shortage of funds, I am still looking forward towards better times. I am taking steps towards coordinating all the different aspects of

† Appendix IV. List of papers by the Staff of the Herbarium published during 1927 to 1949.

botanical researches not only in this country, but also in the neighbouring countries of Asia with this our national institution as the centre for disseminating botanical knowledge worthy of India's past tradition in the field of cultural and scientific advancement. I may assure you, if I get response and collaboration from you all, there is every prospect of our organising florastic researches on an All-Asia basis and India will, as in the political and cultural field, so in the botanical field also, take a forward lead to the progress of botanical science in Asia through the revived Botanical Survey of India.

Ladies and gentlemen, I am always an optimist. I am still confident that good sense will prevail upon our leaders for fostering scientific investigations in our country. They will surely before long realise the great responsibility reposed on them for saving our national botanical treasures from damage and loss and will do all that is required for the development of botanical science in free India as they are doing for the development of the Geological and other Surveys of India. It is therefore hoped that they will improve the conditions of this moribund department and bring it not only to life again but gradually nurture it to its full stature and glory for which my distinguished predecessors the late Surgeon-Major, afterwards Lt.-Col. Sir David Prain, C.M.G., C.I.E., M.A., M.B., I.M.S., D.Sc., LL.D., F.R.S., F.R.S.E., F.L.S., Lt.-Col. A. T. Gage, C.I.E., I.M.S., and Mr. C. C. Calder, B.Sc., B.Sc. (Agr.) F.L.S. stressed so much in the past, and my humble self dreamt, planned and fought for during the last twelve years since I succeeded Mr. C. C. Calder in 1937 for no other purpose but to serve the cause of my beloved mother-land in the domain of botanical science.

Herbarium
Royal Botanic Garden, Calcutta.
March 26, 1949.

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APPENDIX I.

Resolution adopted at the 25th Indian Science Congress Session 1938.

The following resolutions were adopted in connection with the discussion on a National Herbarium :—

(1) That there should be a National Herbarium for India for the use of Botanists, Foresters and Agriculturists and for the preparation of Local and Provincial Floras.

(2) That the existing Herbarium at Sibpur should form the nucleus of the National Herbarium and that it should be located there at its present site.

(3) The existing provision for the assistant for India at Kew should be utilized for deputing members of the Herbarium and University staff to Kew as Liaison Officers for 2-3 years.

(4) The staff at Sibpur Herbarium is not sufficient and that the post of systematic Assistant retrenched by the Government of India as a measure of economy in 1932 be restored.

APPENDIX II.

Some of the recommendations and suggestions on scientific researches in India.

by

Prof. A. V. Hill, M.P., F.R.S.

SURVEYS AND NATURAL RESOURCES

The material resources of India are enormous but most inadequately known. The Botanical Survey was founded in 1890.
The Directorship of the Botanical Survey has been in abeyance for 7 years and very little financial aid has been available for 14 years for botanical field work.

As regards the Botanical Survey, the following extracts are pertinent from a letter written on 13th January 1938 by the late Sir Arthur Hill, F.R.S. then Director of Kew Gardens, to Sir Girija Shanker Bajpai, the Hon'ble Member for Education, Health and Lands.

"The Botanical Survey has a wide field of useful and valuable activities which it can carry out, both in the domains of Pure and Applied Botany, which should be of material benefit to India, and I feel confident that the survey should not only be continued but strengthened.

I hope the post of Director of the Botanical Survey will be continued and I consider it can be most conveniently and usefully linked with the post of Superintendent, of the Royal Botanic Gardens, Calcutta since the Herbarium of the Gardens is, and must continue to be regarded as the National Herbarium of India.

In order that the Calcutta Herbarium at Sibpur may become more truly 'National' it would, I consider be desirable that its maintenance and also that of the Royal Botanic Gardens, Sibpur, should be taken over by the Government of India. The Government of Bengal, no doubt, is justly proud of its long connection with Sibpur, whose garden and magnificent Herbarium it has so ably maintained for so many years. If therefore the Government of Bengal, is to be asked to hand over its Garden and Herbarium to the Government of India, I would suggest that the Government of Bengal be asked to vote an annual sum for the proper maintenance of the Garden and that the Government of India should be wholly responsible for the maintenance of the Herbarium and for the provision of an adequate scientific staff....

Such work should include both a careful study of the wild flora and also a thorough study of the botanical varieties and races of the principal cultivated crops, in order to find out those races etc. which are the most suitable and nutricious for food and for other economic purposes. Lastly provision should be made for the training of Indian Systematic Botanists at Kew, as I have already suggested to the Govrenment of India through the Indian Office."

To the best of my knowledge nothing has been done about these suggestions. They should be taken up again and an effort made, as conditions allow, to set the Botanical Survey on a proper basis.

Views of Sir W. W. Smith,D.Sc., F.R.S., L.L.D., P.R.S.E., Regius Keeper, Royal Botanic Garden, Edinburgh and Professor of Botany University of Edinburgh.

It is unlikely that any good reason can be found to separate the Herbarium from the Botanic Garden. The general practice throughout the world is entirely opposed to such a line of action. From the administrative point of view it would be very akward to have two independent organisations within the same area, and as for the question of removing the herbarium elsewhere, that would entail heavy expenses not only in building but also in staff. I do not see how the proposal can be defended form the point of view of administration nor from the point of view of practical utility nor from the point of view that in the past there has been any apparent need for such a spliting up.

APPENDIX III.

Extract from Editorial—Science and Culture—Vol. XI, P. 105-110, 1946.

"Facilities for the study of biological and botanical sciences under the Academy were greatly increased after 1929, when the main Botanical Gardens in Leningrad, formerly under the People's Commissariat of Agriculture of the R. S. F. S. R. (Russian Socialist Federated Soviet Republic),, were transferred to the U. S. S. R. Academy of Sciences. These gardens were founded in 1714 by Peter I. The Academy had the Botanical Museum which was merged with the newly transferred Botanical Gardens."

"From these two institutions has emerged the famous Botanical Institute of the Academy, which, in 1940, was renamed the Komarov Botanical Institute in honour of Vladimir Komarov, President of the Academy. The Institute's herbarium contained about 5 million specimens in 1943. The library of the Institute, containing more than 135,000 volumes which include the most important literature on the subject of botany since the 15th century, is one of the best libraries in the world."

"A comparision with these activities towards the expansion of botanical institutions and gardens in Russia and elsewhere with those in India shows that the floristic investigation in India is in a deplorable state of stagnation. In India, certain quarters even suggested the suicilal policy of separating the Herbarium from the Royal Botanic Garden at Sibpur, whereas in Russia and other leading countries amalgamation of the herbarium and laboratories with the garden for proper study of all aspects of plant life in the field and the herbarium is considered indispensable."

APPENDIX IV.

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Superintendent, Royal Botanic Garden, Calcutta,
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